CLINICAL APPLICATION OF CIRCULATING MICRORNAS IN NON-INVASIVE PRENATAL SCREENING AND PREGNANCY COMPLICATIONS

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Introduction

Recently, evidence is mounting that non-invasive biomarkers in maternal circulation, such as placental-specific microRNAs (miRNAs), are promising molecules to track pregnancy-related diseases, due to their ease of acquisition and good stability.

This study looked at recent literature to assess the link between miRNA dysregulation and fetal and pregnancy complications.

Results

The mother's bloodstream contains cell-free DNA (cfDNA) from her cells and from the fetus via the placenta. It also contains circulating miRNAs, which control post-transcriptional gene expression by inhibiting translation or degrading messenger RNA (mRNA) (figure 1).

MiRNAs are crucial for fetal development. Their concentration in pregnant women's peripheral blood is intimately related to the course of the pregnancy. MiR-210, miR-152, and miR-411, are differentially expressed in preeclamptic placentas compared to normal placentas (1). In addition, women with Gestational diabetes mellitus have downregulated levels of miR-29a, miR-132, miR-142-5p, miR-222, and miR-4666a-3p. Moreover, miRNAs are connected to fatty acid biosynthesis and metabolism, pro-inflammatory immune responses, trophoblast differentiation and proliferation, insulin production, and glucose transport (2). MiR-103a-3p, miR-126-3p, miR-195-5p, and miR-499a-5p are downregulated in pregnant women with fetal growth restriction (1,3). Additionally, pregnant women with Down's syndrome foetuses have significantly greater amounts of miR-125b-2, miR-155, and miR-3156, which were identified from amniotic fluid by a study of 14 miRNAs encoded by chromosome 21 (4).

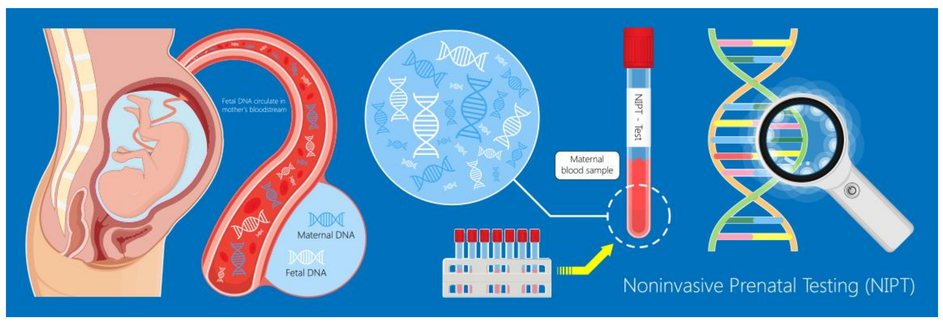

Figure 1: Noninvasive Prenatal Testing

Conclusion

Early diagnostic research on pregnancy abnormalities using miRNAs has been proposed as a new class of circulating nucleic acids with the potential to be helpful therapeutic indicators. This may open new horizons in the investigation of pregnancy pathological conditions, as invasive prenatal diagnosis tests are heavy invasive techniques with a risk of miscarriage.

References

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